Environmental Externalities and State Regulatory Initiatives

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Can Externalities be Incorporated into an Energy Modeling Framework?

- NEMS uses point estimates but externalities are best handled probabilistically
- Geographical scope – NERC region versus county level data, site specific variation of externalities
- Process boundary limitations – emissions at the power plant versus life cycle analysis
- Time of day and seasonal variations – hourly wind velocity data, modeling atmospheric chemical processes to determine concentrations
- Externalities of emerging technologies are unknown (coal IGCC, fuel cells, sequestration)

Externality Model Usefulness

- CAPMS – Does not model utility emissions, no air quality modeling tools, not currently available to the public but may be available through EPA
- EcoSense – Capabilities specific to Europe, not stable and supported
- EXMOD – Database only for NY, adjacent states, and Canadian provinces
- FERET – Does not model utility emissions, no air quality modeling tools
- TAF – Sulfur and nitrogen species only, limited air quality data, peer reviewed in 1996, relies on internal database of US plants
- COBRA – Being developed by EPA as an improvement to CAPMS
- BENMAP – Being developed by EPA to evaluate monetary value of health and environmental impacts

Data Needs of Externality Models

- Geographic distribution of population
- Treatment of global warming
- Existence of highly valued ecosystems
- Background level of pollutants and atmospheric chemistry
- Meteorology
- Local topography

Issues and Challenges

- Modeling mercury transport and fate – Beginning with Annual Energy Outlook 2003, EIA forecasts mercury emissions from power plants
- Valuing risk of premature mortality
- Estimating externalities associated with climate change
- Health impacts of particulate matter, particularly sulfates

Annual Energy Outlook 2004 Activities

- Because of these challenges, AEO2004 (due out in Jan. 2004) will not have environmental externalities
- AEO2004 will have "survey" of state environmental legislative initiatives in "Issues in Focus" section
- These state initiatives sometimes go beyond the Federal requirements
- Some state initiatives respond to NOx SIP call, haze, acid rain

State Environmental Regulatory Initiatives

- 10 states have enacted air emission regulations that impact the electricity generation sector – CT, MA, ME, MO, NH, NJ, NY, NC, OR, TX
- 16 states are considering proposed regulations - CA, CT, DE, IL, MA, MD, ME, NH, NJ, NY, PA, OR, RI, VT, WA, WI
- Most initiatives deal with NOx and SO_2. GHG and mercury regulations are emerging.
- Analysis excludes regulations that impact non-electric-utility sectors (transportation initiatives, GHG registries, land use change, tree planting)
- Corresponding activity at EIA reviews the state renewable portfolio standard (RPS) programs

Connecticut

- Applies to units > 15 MW, or with fuel input of > 250 MMBtu/hr, electricity generation, cogeneration, industrial units
- NOx limit 0.15 lb/MMBtu of heat input
- SO_2 limit Phase I - 0.5% S in fuel or 0.55 lb/MMBtu by January 2002
- SO_2 limit Phase II – 0.3% S in fuel or 0.33 lb/MMBtu by January 2003
- Climate Change Action Plan due by November 2003 designed to meet NEG/ECP goal for CO_2 reduction (stabilization at 1990 levels by 2010 and 10% below 1990 by 2020. Potential participant in NE regional GHG initiative
- In May 2003 legislation required coal-fired power plants to reduce Hg by 90% by July 2008 (equivalent to 0.6 lb Hg emitted/trillion Btu input, or 0.005 – 0.007 lb/GWh)
- Legislator has recommended that DEP consider stricter Hg limits by July 2012

Massachusetts – SO_2, NOx

- Regulation 310 CMR 7.29 "Emissions Standards for Power Plants" applies to existing power plants in MA and would impact 6 older power plants - compliance plans have been submitted
- Two compliance options
  - "Repower" – replace boiler, switch to low S coal, or switch from coal to gas or
  - "Standard" – install low NOx burners, SO_2 scrubbers, SCR, or SNCR
- Incentive for fuel shift by delaying the compliance deadline to October 2008 for the repower path, the standard path would have to comply by October 2006. Most utilities are choosing the repowering path
- NOx standard 1.5 lb/MWh by October 2006 for repowering
- SO_2 and NOx standards are considered to be stricter than CAAA

Massachusetts – GHG, Hg

- CO_2 standard 1,800 lb/MWh by October 2008 for repowering. Potential participant in regional NE regional GHG initiative
- Credits for off-site reduction can be obtained through carbon sequestration or renewable energy projects
- DEP is developing regulations that would determine what projects would qualify as reductions
- Draft mercury regulations released for public comments prior to consideration by legislator

New Hampshire

- May 2002 "Clean Power Act" for SO_2, NOx, CO_2 and Hg from 3 existing fossil power plants – Merrimack, Newington, and Schiller owned by PSNH
- Compliance plans have been submitted to DES and are being reviewed
- PSNH plans to convert 50 MW Schiller unit from coal to fluidized bed combustor that will burn biomass – this will meet MA RPS goals and NH CPA requirements
- No new pollution control equipment – low S coal, SCR, SNCR already installed, additional allowances will be purchased if needed
- SO_2 cap 75% reduction from Phase II Acid rain requirements
- NOx cap 90% reduction from 1990 levels
- CO_2 cap is 3% reduction from 1999 levels

New Jersey

- State goal is to reduce GHG emission 3.5% reduction from 1990 levels by 2005
- January 2002, Justice Dept., EPA, NJ, Clean Air Act settlement with PSEG Fossil – part of PSD/NSR enforcement effort
- Impacts Hudson 2, Mercer 1 and 2, and Bergen
- Technologies being planned: FGD, SCR, baghouse (particulate)
- PSEG to spend $6 million to implement other environmental projects (CO_2 reduction, LFG, Hg emissions monitoring, Hg reduction)
- PSEG to pay $1.4 million monetary penalty

North Carolina

- "Clean Smokestacks Act" impacts 14 coal-fired power plants in NC
- Progress Energy and Duke Power have submitted compliance plans to DENR and are available on the web
- Technologies being considered: FGD, SNCR
- Hg and CO_2 standards being evaluated
- First of 3 reports on Hg and CO_2 have been prepared and are available on the web
- NC to persuade other states to reduce their emissions to similar levels
- TVA planning to install FGD, SCR
- Compliance costs for SO_2 and NOx control to meet "Clean Smokestacks Act" have been released
- SNCR costs range from $5/kW to $64/kW, FGD costs range from $113/kW to $414/kW

Oregon

- First formal standard for CO_2 emissions from new power plants
- Energy Facility Siting Council CO_2 standard is 675 lb/MWh – 17% below most efficient natural gas fired plants in the US
- Requirement can be met through cogeneration, new technologies, or by purchasing CO_2 offsets from carbon mitigation projects
- No geographical limitations on the location of carbon mitigation projects
- Monetary value on the offsets $0.85/ton CO2 or $3.12/ton carbon, or about 0.88 mills/kWh

Proposed Regulations – CA, OR, WA

- Former Gov. Gray Davis of CA, Gov. Locke (WA) and Gov. Kulongoski (OR) announced joint strategy for GHG emission reduction in September 2003
- States to obtain fuel efficient vehicles and low-rolling resistance tires
- Reduce use of diesel generators in ships
- Develop emission free truck stops along I-5 corridor
- Encourage development of renewable energy
- Develop uniform appliance efficiency standards
- Develop consistent GHG emission inventories
- Tools to measure the impact of climate change

Proposed Regulations – NY and Northeastern States GHG Initiative

- June 2001 Gov. Pataki GHG Task Force
- CCAP released report in April 2003 with 27 recommendations
- NY State Energy Planning Board goal to reduce GHG emissions to 5% below 1990 levels by 2010 and 10% below 1990 levels by 2020
- Policy measures impact electricity generation, transportation, renewable energy, regional actions with other states, national and international programs
- Report also recommends extension of NY cap to a regionally coordinated policy to trade CO_2 emissions credits
- Staff level meeting and commissioner level meetings held in September 2003
- Goal is to reach an agreement by April 2005 on a flexible, market-based cap-and-trade program

Existing Regulations in Perspective

- Among the existing regulations, the biggest impact due to the North Carolina "Clean Smokestacks Act"
- NC and other state activities have been incorporated into NEMS through plant file
- Proposed mercury regulations are of interest due to their potential to impact several sectors
- Proposed Northeastern states CO_2 cap and trade initiative could have significant impact